

REMARKS

In the August 19, 2004 Office Action (paper no. 4), the Examiner rejected claims 1-2, 5 and 10 as anticipated over Ferianz (U.S. Patent No. 6,522,179). The Examiner also rejected claims 6-9 as anticipated by Anderson (U.S. Patent No. 5,493,246). The Examiner also rejected claims 3-4 and 11-12 as obvious over Ferianz in view of Anderson.

The present invention is directed toward a circuit which increases the signal to noise ratio on the input signals to a differential amplifier by adjusting the impedance of the input signal relative to ground. Specifically, common mode noise is the presence of an unwanted signal of equal level, frequency and phase on two or more signal carrying conductors such as the inputs to the differential amplifier. Rejection of this type of noise is accomplished by matching the impedances relative to ground of the two inputs. The claimed invention uses an adjustable impedance circuit to match the impedance of the first input with that of the second input relative to ground. In this manner, common mode noise is reduced which then increases the signal to noise ratio.

In contrast, Ferianz is directed toward a different problem, namely that of adjusting the gain of the differential amplifier via adjustable impedances 4 and 7 (Col. 4, lns. 36-40) and the output impedance of the differential amplifier. The output impedance of the differential amplifier is adjusted via impedances 16, 18, (Col. 4, lns. 29-31) 22, and 23 (Col. 4, lns. 6-8) which may be adjustable (Col 6, lns. 7-14). Signal reflections are minimized by matching output impedance to the line impedance Z_L . (Col 1, lns. 39-41). Unlike the present invention, Ferianz does not address common mode rejection at the signal inputs. Since variable impedances are used to adjust the output impedance to match the line impedance Z_L , the configuration cannot be used for common mode rejection as in the present invention which relies on adjusting the impedances to balance the signal inputs.

Similarly the circuit in Anderson has a different purpose than common mode noise rejection. Anderson is directed toward changing the function of an amplifier 14 using programmable impedance blocks 12, 18, 22 and 24. (Col. 2, lns. 5-9). Thus the amplifier 14 can perform different functions depending on the values of the impedance blocks 12, 18, 22 and 24. These blocks may use switches as noted by the Examiner but are not used to reduce signal to noise ratio and specifically do not address common mode rejection because they are not adjusted relative to ground. The use of the impedance blocks for programming the logic of the array as opposed to reducing signal to noise ratio is shown by the need of compensation circuit 28 to compensate for leakage current from the switches which are used in the impedance block 12. (Col. 2, ln. 63 to Col. 3, ln. 9).

In order to further distinguish the present invention from Ferianz, Applicant has amended claims 1 and 10 to require that the impedance adjustment is connected between the input signal line and a ground point and improves rejection of common mode noise by matching the impedance of the two input lines relative to ground. Ferianz neither anticipates nor renders obvious the amended claims. First, Ferianz does not couple the line matching impedances 16 and 18 to a ground point as now required by the amended claims. As explained above, the impedances are designed to match output impedance to line impedance and thus are coupled to feedback loops. Second, the impedance matching in Ferianz does not improve the rejection of common mode noise as now required by these claims. The impedances in Ferianz are directed toward eliminating distortion caused by signal reflections which is distinct from common mode noise. Finally, Ferianz does not match the impedances between the two input lines and ground as now required by the amended claims. Instead, Ferianz matches impedances in series with the input lines to set amplifier gain. Amended claims 1 and 10 are thus allowable over Ferianz.

Claims 3-5 depend from claim 1 and claims 11-12 depend from claim 10 and are similarly allowable.

Applicant has also amended claim 6 to require that the impedance and switches are connected between the input signal line and a ground point which improves rejection of common mode noise by matching the impedance of the two input lines. Anderson neither anticipates nor renders obvious amended claim 6. Anderson does not couple the adjustable impedances 12, 18, 22 or 24 to a ground point as now required by amended claim 6. Further, Anderson does not disclose matching impedances between the two input signals as required by amended claim 6 in order to reject common mode noise. In contrast, Anderson adjusts impedances only for the purpose of configuring the amplifier to change the function of the array. Anderson neither discloses nor suggests matching impedances of the input signals for common mode noise rejection purposes. Amended claim 6 is thus allowable over Anderson. Claims 8-9 depend from claim 6 and are similarly allowable.

Applicant has reviewed the other references of record and respectfully submits that the claims are allowable over these references.

For the foregoing reasons, Applicant respectfully submits that the pending claims (1, 3-6, 8-12) are in condition for allowance and that the Examiner issue a notice of allowance in the above-identified application. The Office is authorized to charge all fees, if any, associated with this Amendment to Deposit Account No. 13-0019.

Respectfully submitted,

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